

# PATENT ABSTRACTS OF JAPAN

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(71)Applicant : NEC YAMAGUCHI LTD

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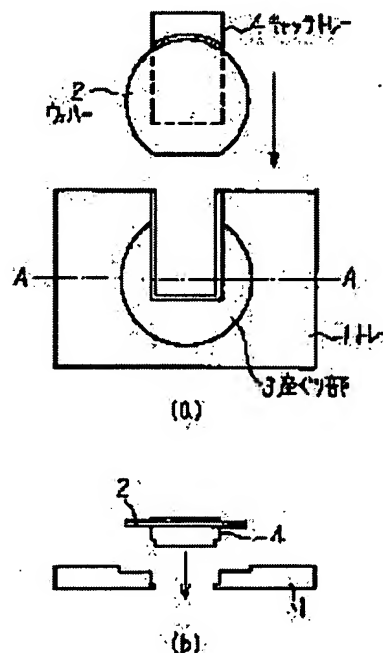
(72)Inventor : TAKEDA MITSURU

## (54) SEMICONDUCTOR WAFER TRANSFER SYSTEM

### (57)Abstract:

**PURPOSE:** To make the avoidance of the decrease in particles and the enhancement of evenness in film thickness feasible by a method wherein, in order to transfer a wafer to an atmospheric pressure vapor deposition device, a catch tray loaded with the wafer is returned to a tray to horizontally lower the tray making alignment with the tray.

**CONSTITUTION:** A catch tray 4 receiving a wafer 2 from a carrier moves in the arrow direction so as to make alignment of the wafer 2 by an arc stepped part provided in the catch tray 4. Later, the catch tray 4 further moves in the same direction descending on a tray 1 to horizontally lower the wafer 2 and then returns to the tray 1. At this time, the descending rate can be controlled thereby enabling the swirling up of particles on the tray 1 to be avoided. Furthermore, the wafer 2 previously aligned with the tray 1 can be inserted into a counter sunk part 3 in the tray 1 without fail.



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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the semi-conductor wafer transport device which has the tray used for manufacture of a semiconductor device etc.

[0002]

[Description of the Prior Art] Conventionally, as shown in the top view of drawing 3 (a), and the sectional view of drawing 3 (b), this kind of wafer transport device The wafer 2 has been put on the chuck 5 by setting a wafer 2 to the chuck 5 with a breaker style, closing a chuck 5 and raising it. When a chuck 5 is moved in the direction of the arrow head of drawing 3 (a) and a wafer comes on the spot facing section 3 of a tray 1, as the arrow head of drawing 3 (b) shows, it opened to right and left at coincidence, and the chuck 5 dropped the wafer 2 on the tray 1, and has put the wafer 2 on the tray 1. Then, a tray 1 is conveyed with a wafer 2 to the reaction chamber of for example, ordinary pressure vapor growth equipment.

[0003]

[Problem(s) to be Solved by the Invention] In an above-mentioned semi-conductor wafer transport device, in case a wafer is dropped on a tray, since a wafer does not fall horizontally but inclines and falls, the particle on a tray can wind it up and it has the trouble of adhering on a wafer. Moreover, since centering of the fall location of a wafer was difficult, when it was fall, it may not go into the spot facing circles on a tray, and there was a trouble of worsening the homogeneity of growth thickness.

[0004]

[Means for Solving the Problem] The semi-conductor wafer transport device of this invention has the structure where wait to the level difference prepared in the tray, and positioning is made while the catch tray which has a level difference for positioning of a wafer returns to a tray and drops a wafer horizontally, after it receives a wafer.

[0005]

[Example] Next, this invention is explained with reference to a drawing.

[0006] Drawing 1 (a) and (b) are a top view and its A-A sectional view in the one example of this invention, respectively.

[0007] In drawing 1 (a) and (b), a wafer 2 is carried on the catch tray 4 from the carrier which is not illustrated by moving in the direction of an arrow head according to the conveyance device which the catch tray 4 does not illustrate. Positioning of a wafer 2 is performed by the level difference of the shape of radii prepared in the catch tray 4 at this time. The catch tray 4 in which the wafer 2 appeared moves in the direction of an arrow head further, and starts downward actuation on a tray 1.

[0008] By controlling the lowering speed of a wafer 2 here, winding up of the particle on a tray 1 can be lessened, and positioning of a wafer 2 also becomes easy with the level difference of the catch tray 4, and the level difference of a tray 1, and a wafer 2 comes to enter certainly in the spot facing section 3 of a tray 1. The catch tray 4 which descended is conveyed with a tray 1 to a reaction chamber, with a wafer carried.

[0009] This example is used for drawing 4 (a) and (b), and they are SiH<sub>4</sub>-O<sub>2</sub>. It is the case where conventional ordinary pressure vapor growth equipment is used for polygonal-line B by the gas of a system when it is each the graph which showed the number of particle on a wafer, and thickness homogeneity at the time of carrying out vapor growth of the silicon oxide film on a wafer 2 and polygonal-line A is this example.

[0010] It turns out that, as for the number of particle, and the homogeneity within a field of thickness distribution, that whose homogeneity within a field of the number of particle on the wafer at the time of [ which

was shown in drawing 4 ] using conventional ordinary pressure vapor growth equipment like and silicon oxide thickness was 20.1 piece / wafer, and 4.4% in the average of ten wafers, respectively has been remarkably improved by becoming 5.2 piece / wafer, and 2.5%, respectively in the case of this example.

[0011] In addition, although considered as the configuration which conveys the catch tray 4 to a reaction chamber with a tray 1 in the above-mentioned example Like other examples shown in the top view and its A-A sectional view of not the thing limited to this but drawing 2 (a), and (b) After it carries out vacuum adsorption of the wafer 2 with a vacuum generator 6 and puts return and a wafer 2 on a tray 1 at the spot facing section 3 of a tray 1, the catch tray 4 moves like an arrow head, and only a tray 1 carries a wafer 2 and it may be made to be conveyed to a reaction chamber. Also in this example, since a wafer descends horizontally and is positioned correctly, the number of particle on a wafer and the homogeneity within a field of thickness distribution improve.

[0012]

[Effect of the Invention] Since it returns to a tray, and it descends horizontally and centering of a wafer is correctly performed after the catch tray which was explained above and on which this invention has a level difference for positioning of a wafer in a semi-conductor wafer transport device like receives a wafer, winding up of the particle to a wafer top decreases, and it is effective in the homogeneity within a field of thickness distribution being improvable.

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DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] It is drawing showing the structure of one example of this invention, and this drawing (a) is a top view and this drawing (b) is the A-A sectional view.

[Drawing 2] It is drawing showing other examples of this invention, and this drawing (a) is a top view and this drawing (b) is the A-A sectional view.

[Drawing 3] It is drawing showing the conventional semi-conductor wafer transport device, and this drawing (a) is a top view and this drawing (b) is the A-A sectional view.

[Drawing 4] It is drawing which compares the conventional example with one example, and drawing showing [ this ] the number of particle on a wafer (a) and this drawing (b) are drawings showing the homogeneity of the thickness distribution on a wafer.

[Description of Notations]

- 1 Tray
- 2 Wafer
- 3 Spot Facing Section
- 4 Catch Tray
- 5 Chuck
- 6 Vacuum Generator

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[Translation done.]

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CLAIMS

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[Claim(s)]

[Claim 1] It is the semi-conductor wafer transport device characterized by returning to a tray after preparing a level difference in said tray, and preparing the catch tray which fits into this level difference, and this catch tray's having the positioning section of a wafer in the semi-conductor wafer transport device equipped with the tray for conveying a semi-conductor wafer to a reaction chamber and receiving a wafer from a carrier, dropping a wafer horizontally, and carrying on a tray.

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[Translation done.]

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B 6 5 G 49/07	C	9244-3F		

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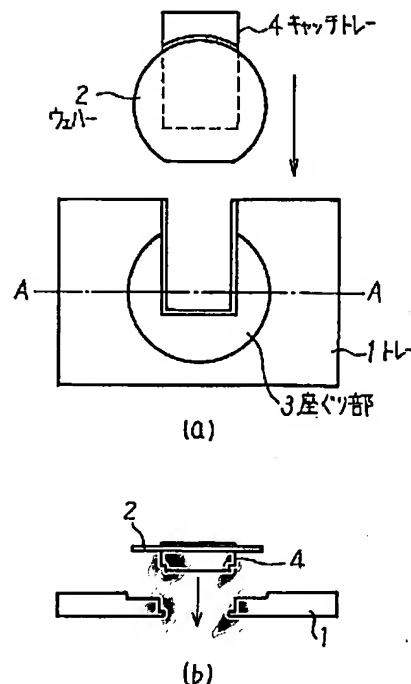
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(54)【発明の名称】 半導体ウェハー搬送装置

(57)【要約】

【目的】常圧気相成長装置にウェハーを搬送する際、キャッチトレイにウェハーを載せた後トレイ上にもどし、ウェハーを水平に降下させ、かつトレイにセンタリングを正しく行なうことにより、パーティクルの減少と膜厚の均一性を改善させる。

【構成】キャッチトレイ4がウェハー2をキャリアから受け取り、矢印の方向に移動することで、キャッチトレイ4に設けられた円弧状段差によりウェハー2の位置決めが行われる。この後、更にキャッチトレイ4は同方向に移動し、トレイ1上で下降動作を行なってウェハー2を水平に降下させトレイ1上にもどる。この下降速度を制御することで、トレイ1上のパーティクルの巻き上げを防止することができる。また、ウェハーの位置決めもなされている為、ウェハー2はトレイ1の座ぐり部3に確実に入る。



## 【特許請求の範囲】

【請求項1】 半導体ウェハを反応室へ搬送するためのトレーを備えた半導体ウェハ搬送装置において、前記トレーに段差を設け、この段差にはまるキャッチトレーを設け、このキャッチトレーはウェハの位置決め部を有し、かつキャリアよりウェハを受け取った後トレーにもどり、ウェハを水平に降下させてトレー上に載せることを特徴とする半導体ウェハ搬送装置。

## 【発明の詳細な説明】

【0001】

【産業上の利用分野】本発明は半導体装置の製造等に使用されるトレーを有する半導体ウェハ搬送装置に関する。

【0002】

【従来の技術】従来、この種のウェハ搬送装置は、図3(a)の平面図および図3(b)の断面図に示す様に、開閉機構をもつチャック5にウェハ2をセットし、チャック5を閉じて上昇させることによってチャック5にウェハ2を載せたまま、チャック5を図3(a)の矢印の方向に移動させ、トレー1の座ぐり部3上にウェハが来た時に図3(b)の矢印で示すように、チャック5が左右に同時に開き、トレー1上にウェハ2を落下させてウェハ2をトレー1に載せている。その後、トレー1はウェハ2と共に、例えば常圧気相成長装置の反応室へと搬送される。

【0003】

【発明が解決しようとする課題】上述の半導体ウェハ搬送装置では、ウェハをトレー上に落下させる際、ウェハは水平に落下せず傾いて落下する為、トレー上のパーティクルが巻き上げられ、ウェハ上に付着するという問題点がある。また、ウェハの落下位置のセンタリングが困難である為、落下の際トレー上の座ぐり部内に入らないことがあり、成長膜厚の均一性を悪化させるという問題点があった。

【0004】

【課題を解決するための手段】本発明の半導体ウェハ搬送装置は、ウェハの位置決めのための段差を有するキャッチトレーが、ウェハを受け取った後トレーにもどり、ウェハを水平に降下させると共にトレーに設けられた段差にはまって位置決めがなされる構造を有する。

【0005】

【実施例】次に本発明について図面を参照し説明する。

【0006】図1(a)、(b)は本発明の一実施例でそれぞれ平面図およびそのA-A断面図である。

【0007】図1(a)、(b)において、キャッチトレー4が図示しない搬送機構により矢印の方向に移動することにより、ウェハ2は図示しないキャリアからキャッチトレー4上に載せられる。このときキャッチトレー4に設けられた円弧状の段差により、ウェハ2の位置決めが行なわれる。ウェハ2の載ったキャッチトレ

ー4は矢印の方向に更に移動し、トレー1上で下降動作に入る。

【0008】ここでウェハ2の下降速度を制御することにより、トレー1上のパーティクルの巻き上げを少なくすることができ、かつ、キャッチトレー4の段差とトレー1の段差とでウェハ2の位置決めも容易になり、ウェハ2はトレー1の座ぐり部3内に確実に入る様になる。下降したキャッチトレー4は、ウェハを載せたままトレー1と共に反応室へと搬送される。

10 【0009】図4(a)、(b)は、本実施例を用いてSiH<sub>4</sub>-O<sub>2</sub>系のガスにより、ウェハ2上に酸化ケイ素膜を気相成長させた場合のそれぞれウェハ上のパーティクル数と膜厚均一性を示したグラフであり、折れ線Aが本実施例の場合、また折れ線Bは、従来の常圧気相成長装置を用いた場合である。

20 【0010】図4に示した様に、従来の常圧気相成長装置を用いた場合のウェハ上のパーティクル数および酸化ケイ素膜厚の面内均一性は、ウェハ10枚の平均でそれぞれ20.1個/ウェハおよび4.4%であったものが、本実施例の場合は、それぞれ5.2個/ウェハおよび2.5%となり、パーティクル数及び膜厚分布の面内均一性は著しく改善されたことがわかる。

30 【0011】尚、上記実施例では、キャッチトレー4をトレー1と共に反応室に搬送する形状としたが、これに限定されるものではなく、図2(a)、(b)の平面図およびそのA-A断面図に示される他の実施例の様に、キャッチトレー4はウェハ2を真空発生装置6により真空吸着してトレー1に戻り、ウェハ2をトレー1の座ぐり部3に載せた後、矢印の様に移動し、トレー1のみがウェハ2を載せて反応室へと搬送されるようにしてもよい。本実施例においても、ウェハは水平に降下し、正しく位置決めされるので、ウェハ上のパーティクル数及び膜厚分布の面内均一性は改善される。

【0012】

40 【発明の効果】以上説明した様に本発明は、半導体ウェハ搬送装置に、ウェハの位置決めのための段差を有するキャッチトレーがウェハを受け取った後トレーにもどり、水平に降下し、かつウェハのセンタリングが正しく行われるので、ウェハ上へのパーティクルの巻き上げが減少し、膜厚分布の面内均一性が改善できるという効果がある。

【図面の簡単な説明】

【図1】本発明の一実施例の構造を示す図で、同図(a)は平面図、同図(b)はそのA-A断面図である。

【図2】本発明の他の実施例を示す図で、同図(a)は平面図、同図(b)はそのA-A断面図である。

50 【図3】従来の半導体ウェハ搬送装置を示す図で、同図(a)は平面図、同図(b)はそのA-A断面図である。



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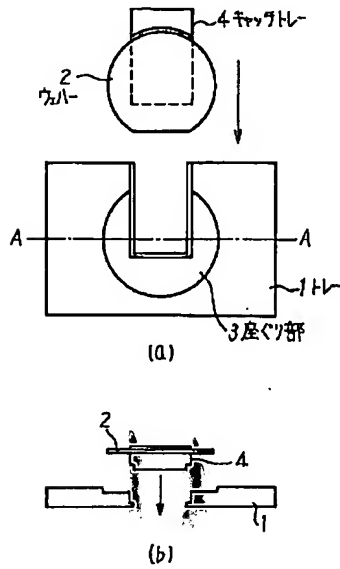
【図4】従来例と一実施例とを比較する図で、同図  
 (a)はウェハー上のパーティクル数を示す図、同図  
 (b)はウェハー上の膜厚分布の均一性を示す図であ  
 る。

【符号の説明】

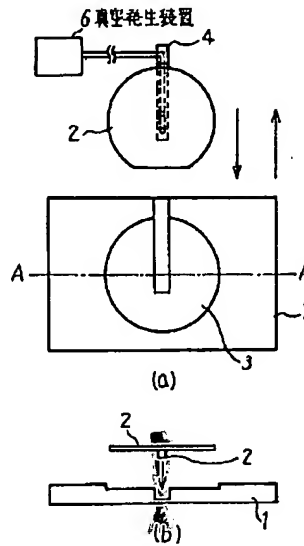
1 トレー

2 ウェハー  
 3 座ぐり部  
 4 キャッチトレイ  
 5 チャック  
 6 真空発生装置

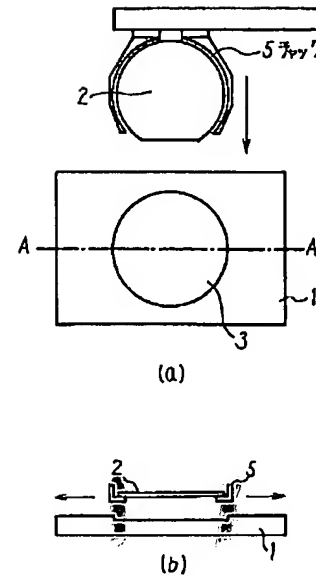
【図1】



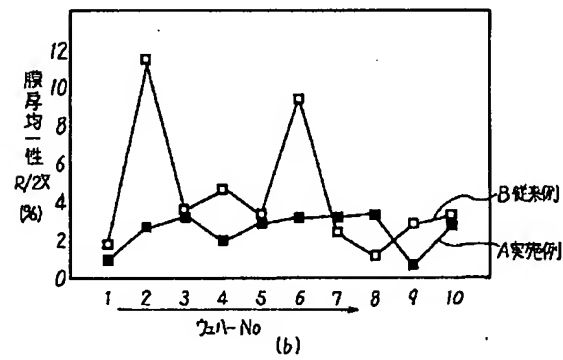
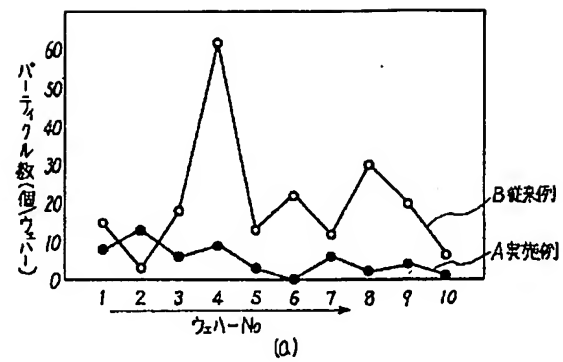
【図2】



【図3】



【図4】



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TITLE: SEMICONDUCTOR WAFER TRANSFER SYSTEM

PUBN-DATE: March 4, 1994

INVENTOR-INFORMATION:

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COUNTRY

N/A

APPL-NO: JP04209887

APPL-DATE: August 6, 1992

INT-CL (IPC): H01L021/68, B65G049/07

US-CL-CURRENT: 414/941

ABSTRACT:

PURPOSE: To make the avoidance of the decrease in particles and the enhancement of evenness in film thickness feasible by a method wherein, in order to transfer a wafer to an atmospheric pressure vapor deposition device, a catch tray loaded with the wafer is returned to a tray to horizontally lower the tray making alignment with the tray.

CONSTITUTION: A catch tray 4 receiving a wafer 2 from a carrier moves in the arrow direction so as to make alignment of the wafer 2 by an arc stepped part provided in the catch tray 4. Later, the catch tray 4 further moves in the same direction descending on a tray 1 to horizontally lower the wafer 2 and then returns to the tray 1. At this time, the descending rate can be controlled thereby enabling the swirling up of particles on the tray 1 to be avoided. Furthermore, the wafer 2 previously aligned with the tray 1 can be inserted into a counter sunk part 3 in the tray 1 without fail.

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